Stat 221  Introduction to Probability and Statistics  Winter 2012

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Office Hours: MWF 10:20 – 11:30, TuTh 2:30 – 3:30, and by appointment and by chance

Class Meetings: MTuWTThF 8:10-9 (sec 2), 9:10-10 (sec 3) in room 02-206  
Course Webpage: http://statweb.calpoly.edu/arossman/stat221/

Overview: Statistics concerns drawing conclusions and making decisions based on data. The practice of statistics involves collecting data, analyzing data, and making inferences from data. The mathematical foundations of statistical inference lie in probability, the study of randomness and uncertainty. This course introduces you to fundamental ideas and methods of probability and statistics. I like to believe, and I’ll try to demonstrate to you, that probability and statistics are extremely important in today’s world and also very interesting.

Goals: By the conclusion of the course, I hope that you have improved your ability to:

- apply and interpret the results of a variety of statistical techniques, including both descriptive and inferential methods;
- understand many of the fundamental ideas of statistics, such as variability, distribution, association, causation, sampling, experimentation, confidence, and significance;
- understand and apply basic ideas and methods of probability;
- analyze and assess statistical arguments, such as those found in the popular press as well as in scholarly publications;
- use statistical software to analyze data;
- communicate your knowledge of statistical ideas effectively.

You can see the expanded course outline (available here) for more specific learning objectives and a more detailed outline of topics.

Course Materials: There is no textbook for this course. I will provide many handouts that we will work through in class. These handouts will be available under “Course Materials” in Blackboard. I will try to post them by 4pm on the previous day if not sooner. I strongly encourage you to print out these handouts in advance and bring them to class.

I will also post pdf files containing draft chapters of a textbook that some colleagues and I are writing. These will also be posted under “Course Materials” in Blackboard. Reading these chapters should help you to follow what we cover in class. You may either print out these chapters or read them online.

I strongly suggest that you obtain a three-ring binder for organizing your handouts and notes. Please bring the handouts and binder to every class meeting. You must also have a scientific calculator and access to the internet and to the statistical software package Minitab outside of class.
**Class Policies:** I strongly encourage you to prepare for and participate in every class session. Not only will this help you to learn the material and perform well in the course, but it will also produce a much more enjoyable learning environment for all of us. Participating in class will typically entail contributing to discussions and working on hands-on activities that I prepare to help you investigate and learn the material.

**Use of Computers:** We will use computers fairly extensively in this course. One use is for communication: I will post much information on the course website, and I will occasionally send course announcements via email. I also invite you to ask questions via e-mail. Computers will also prove useful for learning statistics and for conducting statistical analyses. Many of the activities that we work through in class will entail use of computers.

For these statistical uses, we use the statistical analysis package Minitab and also web-based applets. No prior knowledge of these software tools is assumed; you will receive detailed instructions regarding their use when the need arises. Minitab is freely available in the Studio classroom and in the computer lab in the Library and in other PC labs on campus. You can download a free copy of Minitab from my.calpoly.edu (see instructions on our course webpage), but Minitab is not available for Macintosh computers. The applets can be accessed and run through any web browser.

**Grading Policies:** Your course grade will be determined by the following components, with relative weights as indicated:

- quizzes (12.5%)
- investigation assignments (12.5%)
- two midterm exams (40%: 20% each)
- cumulative final exam (30%)

An additional 5% weight will be added to whichever component produces your highest score.

**Quizzes:** We will have *lots* of quizzes. I will encourage and reward you for class preparation and participation by collecting and grading some aspect of your work, formulated as a quiz, in most class periods. Specific rules for each quiz (individual or group, open- or closed-notes, in-class or take-home, based on what we’ve done that day or from previous days) will vary and will be announced as we go. Missed quizzes cannot be made up or excused, but you may drop your lowest *four* quiz scores before calculating your overall score. (So, for example, if you miss four quizzes due to illness or any other reason, those will be the four that you drop.) These quizzes, and their solutions, will be posted on our course website so that you can check your work afterward.

**Investigation Assignments:** Investigation assignments ask you to investigate a concept or application in some depth. These will be assigned occasionally, roughly an average of one per week. These assignments are often fairly open-ended, requiring both writing and computer work. You may work with one partner on these investigations, submitting one report with both names, provided that both of you genuinely contribute to the work. Word-processed reports of investigations are preferred to hand-written ones, and computer output should be integrated into
the report as appropriate. Investigations are due at the beginning of class on the indicated day, which will be announced in class and posted on our course website. Late investigations will not be graded, and missed investigations cannot be made up. You may drop your lowest investigation score. The investigation assignments will be posted on our course website, and no hard copies of these assignments will be distributed.

The purposes of these assignments are to:
- further your discovery and exploration of course material,
- give you the problem-solving practice necessary to learn, understand, and apply the concepts and techniques presented,
- provide you with feedback regarding your understanding of the material, and
- prepare you for the kinds of questions that will be on the exams.

**Exams:** There will be two mid-term exams and a final exam. Dates will be announced at least one week in advance; a rough indication can be found in the schedule below. You may make up a missed exam only with a written medical excuse. The final exam will focus on more recent material but will also have a cumulative component. These exams will be open-book and open-notes. You will be provided with preparation advice before each exam. One thing to keep in mind is that interpretations and explanations will be as important as calculations.

**Advice:** I offer the following suggestions for learning the course material well and succeeding in this course:

1. **Organize handouts and notes.** I suggest obtaining a three-ring binder for storing and organizing your handouts/notes, in addition to obtaining the textbook. I think you’ll find your handouts/notes to be your most valuable study materials, so please keep them well organized and refer to them often.

2. **Print handouts in advance.** For almost every class period I will post a handout on our course website. I’ll try to make these handouts available by 4pm on the previous day, hopefully much earlier than that. These handouts consist of activities and questions that I design to help you learn and understand the course material. I think you’ll find it very helpful to bring these handouts to class each day and take notes directly on these handouts.

3. **Come to class.** Come to class every day, no matter how early in the morning or late in the afternoon. I know that 8:10am (sec 2) is very early, and 9:10am (sec 3) is not much later. But I really think you’ll benefit from coming to class regularly, no matter how tired you may feel. I’ll do my best to make every class period interesting and occasionally lively. You are responsible for heeding all announcements made in class, whether you are in attendance that day or not.

4. **Participate in class.** Coming to class is of little value if you do not participate. Please think about and respond to the questions asked in class. Try to stay focused on course material, and by all means do not distract others from remaining on task.
5. **Pay attention to context.** Statistics is about data. Data are numbers with a context. I spend a good bit of time and effort on finding genuine studies and real data to present in class and on assignments, in part to show you some of the broad applicability of statistics. When working on assignments and quizzes and exams, be sure to express your conclusions in context. In other words, say “most students in our class got at least seven hours of sleep last night” instead of “most of the dots on the graph are at the values seven and above.”

6. **Expect more than number-crunching.** Statistics is about much more than performing calculations. I also expect you to understand statistical concepts and interpret results from applying statistical methods. Try not to concentrate so much on a specific task that you lose sight of the big picture. And you really will be expected to *think* in this course.

7. **Make use of online resources.** I will post lots of information and resources on our course website. There you’ll find daily handouts, quizzes and solutions, investigation assignments and solutions, exam information and preparation advice, and more. Please make frequent use of these resources. You can also monitor your grade information using BlackBoard. I may also occasionally distribute announcements via email. You are welcome to ask questions of me via email as well.

8. **Use technology.** We’ll use computer software both for exploring statistical concepts and also for analyzing data. We’ll use two kinds of software: applets that can be run from any computer that can access the internet, and Minitab statistical software. The good news is that through a site license with the university, you can download Minitab for free from the [my.calpoly.edu](http://my.calpoly.edu) portal (see instructions posted on our course website). The bad news (for some of you) is that Minitab does not run on Macintosh computers. One consolation is that PC labs on campus, including in the library and in the Business building, have Minitab on their computers.

9. **Work together.** Please feel free to study together and help each other to learn the course material. The policy on investigation assignments is that you can work with one partner and hand in one report with both names, provided that both of you contribute substantially to the work. On some quizzes you will be invited to work with one or more partners. You can always work together on optional problems from the text and to study for exams.

10. **Invest time.** There’s no reason that you can’t do very well in this course, but you will need to spend time outside of class working on it. Your out-of-class activities should consist of reading the textbook, reviewing your notes, working on assignments, solving optional problems, and preparing for exams.

A common theme emerges from this list of advice, important enough that I’ll put it in both bold and italics: **You are responsible for your own learning.** As your instructor, I view my role as providing you with contexts and opportunities that facilitate the learning process. Please call on me to help you with this learning in whatever ways I can.
**Courtesy:** I ask you to please observe some common courtesies, specifically to:
- arrive to class on time;
- do not talk to others when I am talking;
- do not allow your cell phone to ring or send text messages during class;
- write your section number on quizzes and assignments;
- staple pages together when you hand in a multi-page assignment;
- include your name when you send me an e-mail message.

**Tentative Schedule:** The following is always subject to change but should give you an approximate sense for what topics we will cover and when:

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<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
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<tbody>
<tr>
<td>1</td>
<td>Jan 3 – 6</td>
<td>Inference for One Proportion</td>
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<tr>
<td>2</td>
<td>Jan 9 – 13</td>
<td>Sampling, Interval Estimation</td>
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<tr>
<td>3</td>
<td>Jan 17 – 20</td>
<td>Normal Approximation, Confidence Intervals</td>
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<tr>
<td>4</td>
<td>Jan 23 – 27</td>
<td>Exam, Probability</td>
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<td>5</td>
<td>Jan 30 – Feb 3</td>
<td>Experiments and Observational Studies</td>
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<td>6</td>
<td>Feb 6 – 10</td>
<td>Comparing Two Proportions</td>
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<td>7</td>
<td>Feb 13 – 17</td>
<td>Comparing Two Means, Paired Data</td>
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<td>8</td>
<td>Feb 21 – 24</td>
<td>Exam, Comparing Multiple Groups</td>
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<td>9</td>
<td>Feb 27 – Mar 2</td>
<td>Correlation and Association</td>
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<td>10</td>
<td>Mar 5 – 9</td>
<td>Simple and Multiple Regression Analysis</td>
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<td>Mar 12, 16</td>
<td>Final Exam (Mar 12: sec 3, Mar 16: sec 2)</td>
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